

Nobel Laureate Feels Mars May Support Life

Despite Mariner Photos

By WALTER SULLIVAN

One of the nation's leading scientists believes there may be life on Mars, despite the gloomy interpretation placed on the Mariner 4 pictures sent to earth last month.

Such a view has been expressed by Dr. Joshua Lederberg, professor of genetics at the Stanford University School of Medicine. In 1958 Dr. Lederberg shared the Nobel Prize in medicine and physiology. He is an authority on the origin of life on earth and was co-chairman of the National Academy of Sciences panel that last year assessed the scientific importance of exploring Mars.

His views have been backed by Dr. Carl Sagan of Harvard University and the Smithsonian Astrophysical Observatory in Cambridge, Mass. Dr. Sagan has also carried out extensive research relating to the origin of life.

He believes Mars may have had oceans for an extended period, early in its history, and that life could have evolved within such waters. The evidence of water erosion on the landscape of this early, wet period may then have been erased by meteorite bombardment.

No New Factors Seen

Dr. Lederberg's views are set forth in a letter to The New York Times. He says:

"The Mariner photographs are very exciting, but so far they have solidified previous expectations. They have not introduced new elements into the discussion that were not taken account of in previous deliberations."

One of these deliberations was a conference on Mars held in Cambridge last year under the chairmanship of Dr. Sagan. In the course of the discussions it was predicted by Dr. Fred Whipple, head of the Smithsonian Astrophysical Observatory, that Mars would show extensive scars of meteorite impacts.

The reason, he said, is that the orbit of the planet lies close to the asteroid belt, which is cluttered with objects in orbit around the sun, ranging in size from minor planets to small chunks of rock. Dr. Sagan, in a telephone interview, pointed out that the Mariner 4 pictures have confirmed Dr. Whipple's prediction.

Among the numerous craters shown in the photographs are some whose huge, dim outlines suggest they were produced by impacts of very large objects an extremely long time ago. This led the Mariner project

scientists to believe that the planet had never been subjected to extensive water erosion.

No valleys typical of a water-eroded landscape were visible. If there were never bodies of water on Mars, the chances that life originated there would be dim.

However, Dr. Sagan argues that, even if these ancient craters are several billion years old, the history of Mars has probably been sufficiently long so that there could have been one or more billion years, at the start, when the planet could have enjoyed a humid environment. The valleys, carved by running water during this early period, may simply have been erased.

"The main point to stress," Dr. Lederberg wrote, "is that we still do not know the abundance and distribution of water on Mars. However much there is, almost all of it must be frozen." Perhaps, he said, the planet's water supply is largely limited to the thin covering of frost on its poles.

However, he also cited the thesis that considerable quantities of water were locked within the crust of the planet as ice. Since Mars was presumably formed in the same manner as the earth, and from the same primordial material, it must have had the same quota of water to begin with.

It is thought that the earth was swept clear of any atmosphere during the formation of the solar system and that therefore all its initial air and water came from decomposition of its surface rocks and volcanic eruptions from within. Since Mars, too, has an atmosphere, such processes must have taken place there as well, at least to some extent.

In 1962 Drs. Lederberg and Sagan proposed that, while there was little water in the air of Mars, there might be considerable frozen water beneath its surface. In some places this could be melted by volcanic activity, as in hot springs on earth, forming warm pools where life could exist.

Whether Mars is lightly frosted or underlain with vast water reserves, he says in his letter, "we have the likelihood of scattered oases with local conditions far more congenial to life than the average for the planet."

It has been pointed out that a vehicle from another world, scanning ours from over the Pacific Ocean, would not see any evidence of continents. "After all," Dr. Lederberg writes, "too obtuse a view of the earth would have us all submerged in a thousand fathoms of salt water."

"Already," he continues, "the

most exciting aspect of the Mariner pictures is indeed the great variety of surface detail that they do show, including bright patches on some craters suggesting frost."

In recent years, biochemists and geneticists such as Dr. Lederberg have found that, in a lifeless environment, simple inorganic compounds such as ammonia, methane, and water evolve into the complex organic compounds typical of living processes.

The only stimuli needed to bring about such changes are those, such as sunlight, heat and radiation, which would be part of the environment on any planet. So ubiquitous have been these factors, and so convincing the argument about the chemistry of life, that many have been persuaded that life will ultimately appear on any planet as long as there is liquid water and a moderately friendly environment.

This is at the root of Dr. Lederberg's thesis that there may be life in the "oases" of Mars. Many questions, he writes, "need far deeper study before any sweeping conclusions are justified." His letter continues:

"While I doubt that Mars has ever had extensive oceans, it is too early to assert this as settled fact. However, more likely almost all of its water has been frozen for most of its history."

"The swing of general opinion about Mars has undoubtedly been overcolored by lurid fantasies of canal-building humanoid, which have played no part in serious scientific analysis. Now that these have been happily relegated to their proper place in imaginative fiction, our study of the solar system can focus on rigorous factual questions which continue to have the deepest scientific and philosophical interest."

"Paramount among these is whether life, in any form, has evolved independently of the terrestrial system and man."